

AMENDMENTS TO THE CLAIMS

This listing of claims will replace all prior versions, and listings, of claims in the application:

Listing of Claims:

Claims 1-4. (Cancelled).

5. (Currently Amended) A location registration apparatus ~~according to Claim 4,~~ comprising:

a presence area storage unit for storing a presence area information indicating a presence area of a portable communication terminal;

a traveling schedule storage unit for storing a scheduled path information indicating a scheduled path of a moving object and a scheduled time information indicating a scheduled time of the movement of the moving object; and

a control unit for, when the portable communication terminal is moving with the moving object, changing the presence area information of the portable communication terminal stored in the presence area storage unit based on the current time, the scheduled path information, and the scheduled time information stored in the traveling schedule storage unit,

wherein the control unit receives, from a moving object communication apparatus installed in the moving object, an identification information of a portable communication terminal moving with the moving object, and specifies the portable communication terminal moving with the moving object based on the identification information,

wherein the scheduled path information indicates one or more pass areas through which the moving object passes, and the scheduled time information indicates the time for which the moving object is located in each of the pass areas,

wherein, while the portable communication terminal is moving with the moving object, the control unit specifies the pass area within which the portable communication terminal is to be located based on the current time, the scheduled path information, and the scheduled time information, and changes the presence area information of the portable communication terminal to the one corresponding to the specified pass area,

wherein the pass area is a base station area each formed by a base station,
wherein the traveling schedule storage unit stores an auxiliary path information indicating a more extensive area than the pass area indicated by the scheduled path information; and
wherein, when the moving object is not moving on schedule, the control unit changes the presence area information on the portable communication terminal moving with the moving object to a presence area information according to the location of the moving object based on the auxiliary path information and the scheduled time information.

6. (Original) A location registration apparatus according to Claim 5,
wherein the control unit recognizes that the moving object does not move on schedule by receiving, from a base station forming a base station area through which the moving object passes, a notice of abnormal running that indicates that the moving object does not pass the base station area on the schedule indicated on the scheduled time information.

Claims 7-10. (Cancelled).

11. (Currently amended) A location registration apparatus ~~according to Claim 10~~ comprising:

a traveling schedule storage unit for storing a scheduled path information indicating a scheduled path of a moving object and a scheduled time information indicating a scheduled time of the movement of the moving object; and

a control unit for, when the portable communication terminal is moving with the moving object, specifying a location of the moving object based on the current time, the scheduled path information and the scheduled time information in the traveling schedule storage unit, and specifying a presence area of the portable communication terminal based on the location of the moving object,

wherein the control unit receives, from a moving object communication apparatus installed in the moving object, an identification information of a portable communication terminal moving with the moving object, and specifies the portable communication terminal moving with the moving object based on the identification information,

wherein the scheduled path information indicates one or more pass areas through which the moving object passes, and the scheduled time information indicates the time for which the moving object is located in each of the pass areas, and

wherein, when the portable communication terminal is moving with the moving object, the control unit specifies the pass area within which the portable communication terminal is to be located based on the current time, the scheduled path information, and the scheduled time information, and specifies the presence area information of the portable communication terminal to the one corresponding to the specified pass area,

wherein the pass area is a base station area each formed by a base station,

wherein the traveling schedule storage unit stores an auxiliary path information indicating a more extensive area than the pass area indicated by the scheduled path information; and

wherein, when the moving object is not moving on schedule, the control unit specifies the presence area information on the portable communication terminal moving with the moving object according to the location of the moving object based on the auxiliary path information and the scheduled time information.

12. (Original) A location registration apparatus according to Claim 11,

wherein the control unit recognizes that the moving object does not move on schedule by receiving, from a base station forming a base station area through which the moving object passes, a notice of abnormal running that indicates that the moving object does not pass through the base station area on the schedule indicated on the scheduled time information.

Claims 13-14. (Cancelled).

15. (Currently Amended) A mobile communication network ~~according to Claim 14~~ comprising:

a plurality of base stations each of which forms a base station area;

a presence area storage unit for storing a presence area information indicating a presence area of a portable communication terminal;

a traveling schedule storage unit for storing a scheduled path information indicating one or more base station areas through which a moving object accompanied by one or more said

portable communication terminals passes, and a scheduled time information indicating a scheduled time of the movement of the moving object; and

a control station which, when the portable communication terminal is moving with the moving object, specifies a present area information indicating a base station area within which the moving object is predicted to be located based on the current time, the scheduled path information, and the scheduled time information stored in the traveling schedule storage unit, changes the presence area information of the portable communication terminal stored in the presence area storage unit based on the specified presence area information, retrieves the presence area information of the portable communication terminal from the presence area storage unit when an incoming call request to the portable communication terminal is received, and transmits the incoming call request to the base station in the presence area indicated by the retrieved presence area information,

wherein the traveling schedule storage unit stores an auxiliary path information indicating a more extensive area than the base station area; and

wherein, when the moving object is not moving on schedule, the control station specifies the area within which the moving object is located based on the current time, the auxiliary path information, and the scheduled time information, and, based on this information indicating the area, changes the presence area information of the portable communication terminal moving with the moving object.

16. (Cancelled)

17. (Currently Amended) A mobile communication network ~~according to Claim 16~~ comprising:

a plurality of base stations each of which forms a base station area;

a presence area storage unit which stores a presence area information indicating presence areas of a plurality of portable communication terminals, and stores an identification information of a moving object for the portable communication terminal moving with the moving object;

a traveling schedule storage unit for storing a scheduled path information indicating one or more base station areas through which the moving object passes, and a scheduled time information indicating the scheduled time of the movement of the moving object; and

a control station that, when receiving an incoming call request to a portable communication terminal moving with the moving object, specifies the presence area of the portable communication terminal based on the current time, the scheduled path information, and the scheduled time information of the moving object with the identification information, and transmits the incoming call request to the base station in the specified presence area.

wherein the traveling schedule storage unit stores an auxiliary path information indicating a more extensive area than the base station area, and

wherein the control station specifies the presence area of a portable communication terminal moving with the moving object based on the current time, the auxiliary path information and the scheduled time information for the identification information when the moving object is not moving on schedule.

18. (Currently Amended) A mobile communication network according to ~~any one of~~ Claims [[14 to]] 15 and 17:

wherein the base station comprises

a storage unit for storing a scheduled presence time information indicating the time for which the moving object is to be within a base station area of the base station; and

a base station control unit for judging if the moving object is moving on schedule based on the scheduled presence time information, and sending, when judged that the moving object is not moving on schedule, a notice of abnormal running indicating that to the control station,

and wherein the control station recognizes, by receiving the notice of abnormal running from the base station, that the moving object does not move on schedule.

19. (Original) A mobile communication network according to Claim 18,
wherein the base station control unit compares the time at which a notice of the location is received from a moving object communication unit installed on the moving object with the time indicated by the presence scheduled time information, and determines, based on the result of comparison, whether or not the moving object moves on schedule.

20. (Cancelled)

21. (New) A location registration method comprising:

(a) storing, at each of a plurality of base stations, each of which forms a base station area where a portable communication terminal wirelessly communicates with the base station, scheduled path time information indicating a time when a moving object is to be located in the base station area formed by the base station;

(b) storing, at a control station, scheduled path information indicating one or more base station areas through which the moving object is scheduled to pass and scheduled time information indicating a time when the moving object is to be located in each of the one or more base station areas, the control station being an apparatus that manages presence area including one or more base station areas in which the portable communication terminal is currently located and, on a reception of a call request addressed to the portable communication terminal, transmits the call request to one or more base stations forming one or more base station areas included in the presence area;

(c) after steps (a) and (b), when the portable communication terminal moves into the moving object, transmitting an identification of the portable communication terminal from the portable communication terminal to a relay unit installed in the moving object, and transmitting a location registration request containing an identification of the portable communication terminal and an identification of the moving object from the relay unit to the control station via one of the plurality of base stations;

(d) after step (c), when the relay unit detects a movement of the moving object from one base station area to another base station area, transmitting an area change notice containing the identification of the moving object from the relay unit to a base station which forms the another base station area;

(e) determining, at any one of the plurality of base stations, whether the moving object is moving on schedule based on the scheduled pass time information stored at the base station, a current time, and reception or absence of the area change notice, and when it is determined that the moving object is not moving on schedule, transmitting an abnormal running notice containing the identification of the moving object from the base station to the control station;

(f) after the control station receives the location registration request and before the control station receives the abnormal running notice, at the control station, estimating the

presence area on the basis of the scheduled pass information, the scheduled time information, and a current time; and

(g) after the control station receives the abnormal running notice, at the control station, estimating the presence area in a way which is different from step (f).

22. (New) A location registration method according to Claim 21, wherein:

in step (b), the control station stores auxiliary path information indicating extensive areas, each of the extensive areas corresponding to each of the one or more base station areas indicated by the scheduled pass information and being more extensive than the corresponding base station area, and

in step (g), the control station estimates the presence area based on the auxiliary path information, the scheduled time information, and a current time.

23. (New) A control station comprising:

an interface for communicating with a storage unit, the storage unit storing scheduled path information indicating one or more base station areas through which a moving object is scheduled to pass and scheduled time information indicating a time when the moving object is to be located in each of the one or more base station areas;

a receiving unit for receiving a location registration request containing an identification of a portable communication terminal and an identification of the moving object, an abnormal running notice containing the identification of the moving object, and a call request addressed to the portable communication terminal, at a random timing from one of base stations respectively, each of the base stations forming a base station area in which the portable communication terminal can wirelessly communicate with the base station;

a control unit for,

(a) after the receiving unit receives the location registration request and before the receiving unit receives the abnormal running notice, estimating a presence area including one or more base station areas in which the portable communication terminal is currently located, and

(b) after the receiving unit receives the abnormal running notice, estimating the presence area in a way which is different from (a); and

a transmitting unit for transmitting, when the receiving unit receives the call request, the call request to one or more base stations forming one or more base station areas included in the presence area.

24. (New) A control station according to Claim 23, wherein:

the storage unit stores auxiliary path information indicating extensive areas, each of the extensive areas corresponding to each of the one or more base station areas indicated by the scheduled pass information and being more extensive than the corresponding base station area, and

in (b), the control unit estimates the presence area on the basis of the auxiliary path information, the scheduled time information, and a current time.

25. (New) A base station forming a base station area where a portable communication terminal wirelessly communicates with the base station, comprising:

a storage unit for storing scheduled path time information indicating a time when a moving object is to be located in the base station area;

a receiving unit for receiving, from a relay unit installed in the moving object, an area change notice containing an identification of the moving object;

a control unit for determining, whether the moving object is moving on schedule on the basis of the scheduled pass time information, a current time, and reception or absence of the area change notice; and

a transmitting unit for transmitting, when the control unit determines that the moving object is not moving on schedule, an abnormal running notice containing the identification of the moving object to a control station for managing presence area in which the portable communication terminal is currently located.